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Professor H. D. Rogers observed that this would indicate a more recent age for the bird-tracks of the Connecticut Sandstone.

Professor Agassiz remarked, in reference to the footmarks of the Potsdam Sandstone, which Professor Owen had described as those of turtles, but which he at the same time maintained were those of Crustaceans, have now been admitted by Owen himself to belong to the latter; so that there is no evidence that reptiles have been found below the coal.

Professor H. D. Rogers alluded to bones of reptiles having been found in Germany in strata equivalent to the carboniferous limestone, one degree older than the coal. Professor Agassiz doubts if these are reptilian bones.

Dr. Hayes connected the coal deposits of the two States by the additional fact, that the chemical constitution of the accompanying rocks, according to his own examination, is the same.

Professor Agassiz presented a list of fishes found in the Tennessee River, in all thirty-three species, and of several genera not found in Europe. He mentioned the fact, that many exclusively American species, found in the Southern States from Virginia downwards, are not found in the more Northern States; he indicated several localities of small extent, which have fishes exclusively their own, so that any former communication of rivers could not explain their limited geographical distribution. The genera are common over extended localities, but each region has its representative species.

Three hundred and ninety-first meeting.

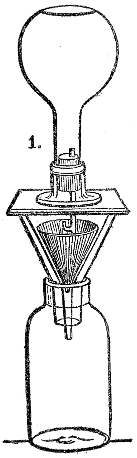
December 27, 1853. — Semi-Monthly Meeting.

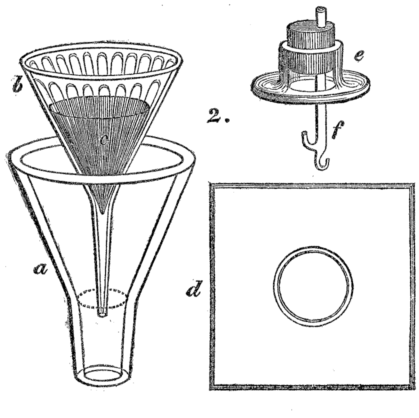
The Academy met at their Hall, the Corresponding Secretary, and afterwards the President, in the chair.

The Recording Secretary being absent, Mr. J. H. Abbot was appointed Recording Secretary *pro tem.*

Professor Cooke exhibited and described some apparatus contrived by him for excluding the action of atmospheric air during the process of filtration. By means of it, this process may be conducted either in a confined portion of air, *in vacuo*, or in any gas.

"It is frequently important in chemical analysis to conduct the process of filtration either *in vacuo* or in a neutral gas, and especially in an atmosphere free from carbonic acid. In order to overcome certain difficulties, I have been led to contrive an apparatus for this purpose, which I believe to be superior to all others now in use, both on account of its simplicity and its cheapness. The complete apparatus is represented in Fig. 1, and some of its parts enlarged appear in Fig. 2. It consists of a wide-mouthed glass bottle, into the neck of which is ground with emory a funnel (*a*, Fig. 2), having a short but large spout. This funnel is made sufficiently thick to resist the atmospheric pressure, and its rim is ground so that it may be closed air-tight by a glass plate, or by a brass plate, connecting with an air-pump. Within this outer funnel the common filtering-funnel is placed, resting loosely against its side so as to allow a free passage of air. In order to wash the precipitate, a glass plate having a hole an inch and a half in diameter drilled through its centre (*d*, Fig. 2) is substituted for the covering-plate. Through this passes the tube of the washing-bottle (*f*, Fig. 2). The washing-bottle is made in the ordinary way, except that it is fitted with a cork, which projects about an

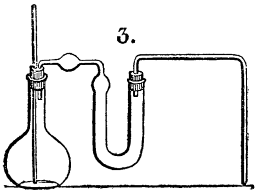

1.


2.

inch above the neck. The upper end of the cork fits the neck of a glass plate ground on the under side, made as is represented at *e*, Fig. 2. This plate is about three inches in diameter, and when resting upon the plate *d*, as is represented in Fig. 1, covers the hole completely, and permits sufficient lateral motion to bring the stream of water on different parts of the precipitate.

" Numerous processes in which this apparatus may be applied will suggest themselves to any chemist. I will only mention one in which I have found it very useful. In the ordinary process of separating alumina and sesquioxide of iron from the alkaline earths, the sesquibases are precipitated by caustic ammonia, which does not, as is well known, precipitate the alkaline earths when perfectly caustic. Since, however, the best liquid ammonia contains carbonic acid, and as, during the precipitation and subsequent filtration, carbonic acid is absorbed from the air, it invariably happens that small amounts of the alkaline earths are precipitated as carbonates. It becomes, therefore, necessary to redissolve the precipitate, and repeat the process in order to obtain a complete separation. This repetition, I think, may be avoided by using ammonia gas made caustic by lime, and conducting the filtration in the apparatus just described. The substitution of ammonia gas for liquid ammonia in this process has been made by many chemists. I use for precipitating with caustic ammonia gas the little apparatus represented in Fig. 3. Strong liquid ammonia is placed in the flask, where it is gently heated, and the resulting gas passed through a chloride of calcium tube into the solution. To the end of the bent tube I attach, by means of a caoutchouc connector, a short tube which dips into the fluid. This, when the precipitation is completed, can readily be disconnected, and any adhering precipitate easily removed. The fluid with the precipitate I now throw upon the filter arranged in the apparatus above described. As the process of filtering and the subsequent washing is conducted in a very confined space, which can easily be entirely deprived of carbonic acid, no precipitation of the alkaline earths is possible, so that they are completely separated from alumina and sesquioxide of iron at the first precipitation.

3.



" I use two sizes of the filtering apparatus, which differ from each other, however, only in the size of the bottle. In both, the diameter of the outer funnel is about five inches, but in one size the bottle has the capacity of a pint and in the other of a quart. I employ the larger size only when a prolonged washing of the precipitate is necessary. The cost of the apparatus complete is only two dollars, the price of an ordinary filtering-stand with iron rings."

Professor Gray presented a communication entitled, "Notices of New Species of Mosses from the Pacific Islands," by William S. Sullivant.

"The Mosses here noticed are a part of the collections made by the United States Exploring Expedition under the command of Captain Charles Wilkes; and are presented in this form for the purpose of securing to the Expedition the priority of their discovery. Similar notices of new Mosses and Hepaticæ from Tierra del Fuego and Oregon, belonging to the same collections, have already appeared in the second volume of Hooker's Journal of Botany (1850).

"1. HYPNUM APERTUM (n. sp.): monoicum; caule prostrato elongato arcte repente pinnatim ramoso; ramis dissitis inæqualibus complanatis; foliis laxissime bifariam imbricatis suboblique orbiculari-ovatis acuminulatis concaviusculis ecostatis firmiusculis subscariosis pellucidis estriatis integerrimis nitidis minute elliptico-areolatis; capsula suburceolata horizontali pendulave annulata; operculo hemisphærico-conico; pedicello flexuoso-erecto lævi. — Hab. On the ground, Tahiti, Society Islands.

"2. HYPNUM MOLLUSCOIDES (n. sp.): pusillum, dioicum; cæspite deplanato intricato mollissimo lutescente; caule fasciculatim diviso, divisionibus densissime plumæformi-pinnatis; foliis e basi lata lanceolato-attenuatis falcatis secundis vix serrulatis costellis binis brevissimis indistinctis minute lineari-areolatis cellulis basilaribus laxioribus majoribus; perichætialibus stricto-convolutaceis apice longe attenuatis patentibus; capsula minuta ovali-urceolata horizontali vel pendula; dent. peristomialibus lanceolato-subulatis dense trabeculatis, ciliis carinato-stereodontibus, ciliolis singulis binisve validis granulosis sæpe rimosis; annulo ægre solubili; operculo hemisphærico-conico recte rostellato; pedicello longiusculo gracillimo. — Hab. Tahiti, Society Islands.

"3. HYPNUM WILKESIANUM (n. sp.): dioicum, majusculum, sordide rufescens; cæspitibus extensis laxis; caulibus prostratis rigidiusculis

paucirameis vel dissite subpinnatis, ramulis longiusculis attenuatis teretibus vel subcompressis basi fructiferis; foliis ovato-lanceolatis concavis patenti-divergentibus incurviusculis ruguloso-striatis basi lata saccato-plicatis, margine toto ambitu serrulatis inferneque recurvis, costa valida ad apicem fere attingente, dense areolatis, cellulis minutissimis oblongis; perichætialibus exterioribus squarrulosis interioribus filiformi-elongatis erecto-flexuosis apice serratis; capsula cylindraceo-oblonga erecta subæquali annulata basi subattenuata; operculo longe erecto-aciculari-rostrato; pedicello flexuoso longissimo; peristomii dentibus lineari-attenuatis strictiusculis dense trabeculatis, ciliis e membrana eciliolata tenuibus carinatis; columella emergente; sporis majusculis; archegoniis 40 – 50; antheridiis 35 – 40; paraphysibus floris utriusque copiosissimis. — Hab. Hawaii, Sandwich Islands.

"4. HYPNUM PICKERINGII (n. sp.): monoïcum, pusillum, plumulosum; cæspite compacto; caulibus inferne sordide rufescentibus superne aurescentibus nitidulis vage ramosis; ramis erectiusculis apice subuncinatis dense subcompresse foliosis; foliis oblongo-lanceolatis concavis filiformi-attenuatis basi patentibus dehinc erecto-incurvis apice subtubuloso serrulato patentiusculo interdum subsecundis ecostatis scariosis, cellulis densissimis valde elongatis transversim striato-granulosis plus minus minutissime papillulosis, alaribus utrinque binis ternisve subquadratis amplissimis vesiculæformibus hyalinis flavidulis; perichætialibus oblongo-convolutaceis subito serrato-acuminatis; pedicello longiusculo tenui debili superne tuberculoso-scaberrimo inferne lævi; capsula minuta ovali-urceolata subpendula; peristomii dentibus linea axili lata pellucida notatis dense articulatis intus valde prominenter lamellosis; ciliis e lata membrana carinatis foraminulosis capillari-attenuatis ciliolis singulis interpositis; operculo longissime aciculari-rostrato; calyptræ junioris cellulis spiraliter dispositis. — Hab. Mountains behind Honolulu, Oahu, Sandwich Islands.

"5. HYPNUM ARCUATUM (n. sp.): monoicum, plumulosum, delicatulum; caule prostrato rectangulariter parce diviso, divisionibus breviusculis dense pinnatis, ramulis compressiusculis; foliis lanceolatis acuminatis serrulatis ecostatis patenti-divergentibus incurviusculis laxe positis distiche directis minute lineari-areolatis; capsulis inæquilateralibus annulatis e pedicelli longissimi arcu latissimo apiciali pendulis; operculo hemisphærico-conico; flore masculo gemmiformi cauligeno, antheridiis 8 – 10 paraphysatis. — Hab. East Maui, Sandwich Islands.

" 6. HYPNUM MUNDULUM (n. sp.) : monoicum, parvulum, delicatulum, pallide lutescenti-viride, laxe implexum ; caule repente parce diviso pinnatim confertius ramuloso ; foliis patentibus laxissime disticheque dispositis e basi constricta subauriculata lanceolatis longe acuminatis concaviusculis ecostatis, marginibus erectis superne lenissime serrulatis tenuissime lineari-areolatis, cellulis basilaribus amplissimis oblongis vesiculæformibus pellucidis ; pedicellis aggregatis tenuibus longiusculis lævibus ; capsula gibboso-brevi-oblonga ; operculo conico acuminulato ; perichætialibus oblongo-convolutaceis ex apice rotundata eroso-dentata subito in acumen longissimum filiforme flexuosum varie directum eductis ; antheridiis 12 – 15, abunde paraphysatis ; fol. perigon. filiformi-acuminatis. — Hab. District of Puna, Hawaii, Sandwich Islands.

" 7. HYPNUM ? SPECIOSISSIMUM (n. sp.) : elatum, filicoideum, aurescente-spadiceum ; caule (plantis masculis tantum visis) primario repente radiciformi robusto radiculis atropurpureis densissime vestito, stipites fuscos erectos firmos minute squamæformi-foliosos (veluti nudos) apice in frondem planam ovato-lanceolatam superne pinnatim inferne bipinnatim ramosam ramificatos emittente ; ramis superioribus patentibus strictis hystricose-foliosis, inferioribus patentioribus rectangulariter ramulosis, ramulis breviusculis subgeniculato-flexis ; foliis axis centralis majusculis dissitis strictis bifariis elongato-triangulari-lanceolatis longe acuminatis subplanis, rameis ramulinisque multo minoribus confertis erecto-patentibus e basi elongato-elliptica longissime lineari-eductis, omnibus superne argute serratis margine plus minus indistincte incrassato-limbatis costa dorso versus apicem dentata valida percurrente cuspidatis ; areolatione densissima e cellulis minutis linearibus prosenchymaticis maxime pachydermibus composita ; perigoniis numerosis valde conspicuis elongato-ellipsoideis acuminatis substipitatis axillaribus in ramorum axisque superiorum longitudine utrinque seriatim positis ; foliis perigon. inferioribus minutis ovato-acutis, superioribus convoluto-lanceolatis filiformi-acuminatis usque ad apicem subdentatam costatis, interioribus late ellipticis convolutis breviter obtuse apiculatis mediotinus costatis ; antheridiis 3 – 5 majusculis elongatis pedicellatis paraphysatis. — Hab. Feejee Islands.

" 8. HYPNUM TUTUILUM (n. sp.) : monoicum ; caule prostrato extense arcteque repente bis terve diviso, divisionibus densissime pinnatis; foliis e basi constricta ovato-lanceolatis decurvo-falcatis subrugulosis lineari-areolatis basi brevissime bicostatis; capsula horizontali vel pendula suburceolata annulata, ore subobliquo; peristomii hypnoidei ciliolis cilia æquantibus ternatim interjectis; operculo hemisphærico-conico; pedicello lævi flexuoso-erecto; flore masculo gemmiformi cauligeno paraphysato. — Hab. Island of Tutuila, Samoan or Navigators' Group: also Feejee Islands.

" 9. HYPNUM DRAYTONI (n. sp.): dioicum, robustum, speciosum; cæspite laxo lato; caulibus prostratis elongatis flaccidis turgido-compressis parce divisis; foliis laxe imbricatis distiche-appressis oblongis ovato-oblongisve decurrentibus cochleariformi-concavis obtusis acumine brevi flexuoso terminatis lutescente-viridibus nitidulis pellucidis brevissime furcato-costatis, margine erecto integerrimo, cellulis elongatis angustissimis densis, infimis brevioribus amplioribus; capsula in pedicello lævi longiusculo rigido horizontali arcuato-oblonga annulata; operculo conico-acuto; peristomii dentibus lanceolato-subulatis dense trabeculatis, ciliis æquilongis carinatis imperforatis e membrana latissima, ciliolis brevioribus ternatim interjectis; antheridiis numerosissimis paraphysatis; perichætialibus ovatis seu ovato-lanceolatis, internis oblongo-lanceolatis basi vaginantibus margine superne subcrenato-undulatis. — Hab. Forest at the eastern base of Mauna Kea, Hawaii, Sandwich Islands.

" 10. HYPNUM ARISTATUM (n. sp.): dioicum ? robustum, rigidum, flavo-viride; caulibus 3 – 4-uncialibus erecto-flexuosis decurvis e massa radiciformi nigra sepulta assurgentibus parce ramosis, ramis elongatis abbreviatisve simplicibus raro subpinnatis hispidulose foliosis; foliis undique versis confertis erecto-patentibus strictis e basi subcordata oblongo-lanceolatis costa valida percursis longeque aristatis integerrimis margine inferne recurvis concavis subimplanis e cellulis subrotundis minutis densius conflatis; capsulis ovali-oblongis subæqualibus basi attenuatis; pedicellis breviusculis erecto-incurvis aggregatis prope apicem ramorum; peristom. dentibus lanceolatis subulatis dense articulatis, ciliis e membrana plicata lata carinatis lanceolatis attenuatis dorso hiantibus, ciliolis binis interpositis appendiculatis; perichætialibus parviusculis laxius imbricatis supra medium patentibus filiformi-eductis indistincte costatis; vaginula emergente oblonga; paraphysibus filiformibus 6 – 10 septatis; operculo et calyptra non visis. — Hab. Bay of Islands, New Zealand.

"11. HYPNUM OPÆODON (n. sp.): dioicum? aureo-flavidum, nitidum; caulibus prostratis irretitis latum densum cæspitem efficientibus breviusculis rectangulate divisis, divisionibus dense et eleganter pinnatis parum subbipinnatis; ramulis complanatis; foliis confertis ovato-lanceolatis acuminatis serrulatis subfalcatis secundis estriatis caviusculis ecostatis vel brevissime subbicostatis margine inferne reflexis, cellulis pallidis tenuissime linearibus, basi alisque 3 – 5 utrinque amplissimis vesiculæformibus flavidis hyalinis; perichætii longiusculi foliis exterioribus ovatis, interioribus oblongis striatis, omnibus vaginantibus longissime acuminatis acumine grosse dentato flexuoso; vaginula emergente copiose paraphysata; pedicello erecto-flexuoso sesquiunciali et ultra; capsula cylindraceo-oblonga erecta plagiostoma uno latere curvula in collum subglobosum abrupte desinente; operculo conico oblique rostrato; peristomii dentibus lineari-lanceolatis in axi plus minus fenestratis sinuato-articulatis veluti ad latera grosse irregulariter crenato-dentatis, ciliis e membrana plicata haud lata carinatis carina interrupte hiantibus, ciliolis subnullis; sporis majusculis. — Hab. Forest at the eastern base of Mauna Kea, Hawaii, Sandwich Islands.

"12. HYPNUM EUDORÆ (n. sp.): monoicum; caulibus prostratis elongatis complanatis paucirameis lutescentibus nitidis; foliis laxiuscule subbifariam imbricatis ovato-oblongis obtusis cymbiformi-concavis estriatis subito tenuiter inflexo-flexuoso-acuminatis integerrimis angustissime lineari-cellulatis marginibus erectis basi constrictis, costellis binis indistinctis vix ullis; perichætialibus longe cylindraceis apice attenuatis patentibus; capsula anguste oblonga erectiuscula subinæquali in pedicellum rubrum longiusculum clavellato-attenuata; peristomio euhypnoideo pallido, ciliolis binis longis; annulo duplici spectabili; operculo conico-brevi-rostrato; calyptra cuculliformi; vaginula conico-oblonga eparaphysata: gemma mascula cum paraphysibus. — Hab. Kaala Mountains, Oahu, Sandwich Islands.

"13. HYPNUM DECURRENS (n. sp.): dioicum? majusculum; cæspite aureo-nitente; caulibus prostratis elongatis subcomplanatis parce pinnatim ramosis, ramis distantibus inæqualibus subuncinatis; foliis laxiuscule imbricatis decurvo-subfalcatis e basi cordata auriculata decurrente lanceolatis tenuiter acuminatis concaviusculis substriato-implanis toto ambitu serrulatis margine erecto cellulis tenuissimis compactis, alaribus majoribus laxis pellucidis subquadratis, costis binis brevissimis subobsoletis; perichætialibus exterioribus oblongo-ovatis acuminatis, interioribus e basi oblonga in acumen longissimum ligulatum denticulatum flexuosum eductis ecostatis; archegoniis 35 – 40 abunde paraphysatis; pedicellis (in specimine unico fertili binis ex eodem perichætio) breviusculis erecto-flexuosis lævibus; capsula pachydermi horizontali gibboso-brevi-oblonga. — Hab. Kaala Mountains, Oahu, Sandwich Islands.

" 14. Hypnum tenuisetum (n. sp.): monoicum; caule prostrato longissimo tenui flexili apice flagelliformi parce diviso, divisionibus dissite pinnatis ramulis brevibus; foliis patenti-divergentibus laxe sub-distichis e basi cordata lanceolatis concavis serratis indistincte brevissime bicostatis lineari-areolatis, cellulis marginalibus conspicuis; capsula minuta gibboso-oblonga pendula; peristomio (læso) hypnoideo; pedicellis numerosis gracilibus longis; perichætialibus filiformi-attenuatis flexuosis serratis dorso papillosis: flore masculo gemmiformi cauligeno paraphysato; operculo calyptraque deficientibus. — Hab. Island of Tutuila, Samoan or Navigators' Group.

" 15. Hypnum molliculum (n. sp.): monoicum, perpusillum, flaccidum, lutescente-viride, nitidulum; cæspite laxo; caule repente vage diviso, ramis adscendentibus compressiusculis laxe foliosis; foliis patentibus e basi lata subtruncata concava oblongo-lanceolatis tenuiter longe acuminatis apice cellula unica lineari terminatis brevissime obsolete bicostatis, areolatione laxiuscula e cellulis longissimis flexuosis basi multo brevioribus latioribus pellucidioribus composita; capsula subgibboso-oblonga; pedicello debili flexuoso lævi; peristomii dentibus late lanceolato-linearibus arcte articulatis, ciliis æquilongis carinatis e membrana lata ciliolis singulis interpositis; foliis perichætialibus laxe imbricantibus erectis, superioribus longissime acuminatis; vaginula emergente; antheridiis 4 – 5 haud paraphysatis. — Hab. Forest at the eastern base of Mauna Kea, Hawaii, Sandwich Islands.

" 16. Hypnum sodale (n. sp.): dioicum? exiguum; cæspite laxo complanato sordide fulvo; caule decumbente semel diviso, divisionibus densissime pennæformi-pinnatis; foliis e basi lanceolata attenuatis falcato-secundis ecostatis lenissime serrulatis laxiuscule lineari-areolatis; perichætialibus laxis longe attenuatis flexuoso-erectis apice denticulatis; capsula ovato-urceolata exannulata horizontali pendulave; peristomii euhypnoidei ciliolis binis breviusculis; operculo hemisphærico recte breviter rostellato; pedicello tenuissimo longiusculo. — Hab. Eimeo, Society Islands.

"17. HOOKERIA TAHITENSIS (n. sp.): dioica? caule arcte repente radiculoso dense simpliciterque pinnato, ramulis brevibus obtusis basi fructiferis; foliis laxiuscule subbifariam positis, lateralibus patentissimis, ellipticis breviter acuminatis cymbiformi-concavis striatulis apice undulato-constrictis margine reflexis serratis breviter gemello-costatis tenuiter lineari-areolatis subpellucidis minute papillosis fulvo-viridibus nitentibus; perichætialibus erectis subconniventibus oblongo-lanceolatis plicatis ciliato-dentatis superne dorso ciliato-papillosis; capsula exannulata erectiuscula cylindraceo-oblonga subinæquali; pedicello breviusculo superne papilloso; peristom. dentibus lineari-lanceolatis dense trabeculatis, ciliis brevioribus carinatis e membrana modice exserta, ciliolis rudimentariis; operculo e basi conica longe subulato-rostrato; calyptra elongato-mitræformi pilis erectis simplicibus compositisve obsita basi pilis loriformibus denticulatis fimbriata. — Hab. Mountains of Tahiti, Society Islands.

"18. MNIADELPHUS VITIANUS (n. sp.): dioicus; caule adscendente frondiformi simplicii vel raro 1 – 3 ramoso; foliis distiche imbricatis e basi oblonga orbiculari-spathulatis toto ambitu marginatis abrupte cuspidatis (cuspide torta) undulato-implanis glauco-viridibus mollibus pellucidis superne laxe rotundato- inferne laxissime oblongo- hexagono-areolatis mediotinus costatis; perichætialibus laxis ovali-ovatis concavis; capsula minuta ovali longicolla subæquali exannulata horizontali; dentibus peristomialibus dense articulatis linea lata pellucida notatis, pedicello valde tuberculato cygneo-flexuoso basi incrassato; operculo subulato-rostrato; calyptra mitræformi setoso-hirta basi cellulis longissimis simplicibus fimbriata: flore masculo gemmiformi stipitato axillari; antheridiis numerosis, paraphysibus subnullis. — Hab. On decayed wood, Feejee Islands.

"19. HOOKERIA DEBILIS (n. sp.): caule prostrato irregulariter diviso arcte repente; foliis lanceolatis longe acuminatis ecostatis flaccidis dissitius positis varie directis flexuosis laxissime fusiformi-areolatis integerrimis; capsula clavato-cylindraceo elongata arcuata horizontali; operculo e basi ampla hemisphærica decurve longissime rostrato; peristomii dentibus linearibus acuminatis dense trabeculatis dorso rima lata hiantibus, ciliis carinatis e membrana basilari angustiore eciliolata; pedicello erecto longiusculo lævi; calyptra non visa. — Hab. Feejee Islands: also Samoan or Navigators' Group: growing on a Fern.

"20. Hookeria oblongifolia (n. sp.): hermaphrodita; caule prostrato intricato-ramoso complanato; foliis oblongis laxius positis distiche imbricatis denticulatis dense minuteque rotundato-areolatis papillosis bicostatis costis validis fere ad apicem percurrentibus; pedicello longiusculo lævi erecto e caule primario; calyptra mitræformi leviter cristato-lineata basi in lacinias 10 – 12 canaliculatas fissa. — Hab. Samoan or Navigators' Islands; parasitic on Ferns.

"21. Pilotrichum setigerum (n. sp.): dioicum? speciosum, molle, aureo-nitens; caule repente radiciformi nudo ramos subsimplices adscendentes elongato-subclavæformes bi-triunciales compressiusculos turgide foliosos apicem versus fructiferos emittente; foliis confertis erecto-patentibus ellipticis acuminatis longitudinaliter valde plicatis superne serrulatis ecostatis scariosis lineari-areolatis, cellulis exilissimis pachydermibus horizontaliter seriatis basi rufo-aurantiaceis; perichætiis exiguis; capsula (supramaturis et junioribus tantum visis) immersa ovato-cylindracea brevissime pedicellata pachydermi; perichætialibus inferioribus ovato-lanceolatis acuminatissimis, superioribus elongato-oblongis convolutaceis lævibus e basi fere ad apicem obtusum grosse dentatum ecostatis dehinc costa in setam longissimam rigidam dentatam excedente instructis; peristom. dentibus linearibus arcte articulatis transversim striatulis linea axili lata notatis; ciliis e membrana latissima plicata; operculo recto longe rostrato; calyptra mitræformi; archegoniis circa 24; paraphysibus dimidio brevioribus. — Hab. Feejee Islands.

"22. Cryphæa cuspidata (n. sp.): monoica, parvula, sordide lutescens; caule primordiali prorepente defoliato; ramis uncialibus et ultra adscendentibus arcuato-reclinatis pinnatim et fasciculatim breviramulosis; foliis madefactis erectis, siccis arcte adpressis ruguloso-striatis late ovatis acuminatis ovato-lanceolatisve cymbiformi-concavis integerrimis carinato-costatis, costa valida cum apice evanescente, margine inferne recurvo, cellulis minutis subpunctiformibus; perichætiis in ramulis brevissimis terminalibus numerosis seriatis secundis; foliis perichætialibus interioribus oblongis costa rigida longe excurrente cuspidatis; capsula immersa oblongo-ovata breviter pedicellata speciose annulata; operculo e basi conica oblique rostrato; peristom. dentibus lineari-lanceolatis linea mediali notatis trabeculatis apice granulosis, ciliis angustioribus æquilongis subappendiculatis; calyptra mitræformi-dimidiata apice papillulosa: gemmis. masc. axillaribus subpedicellatis;

antheridiis 5 – 7 longe pedicellatis; paraphysibus paucis curtis; foliis perigon. late ovatis recurvo-apiculatis ecostatis sublimbatis. — Hab. Vicinity of Valparaiso, Chili.

"23. NECKERA TRICOSTATA (n. sp.): dioica? majuscula, fusco-lutescens; caule primario repente radiciformi subterraneo ramos erectos inferne atratos defoliatos superne speciose dendroideo-ramulosos emittente, ramulis elongatis flexuosis simplicibus compositisve dense foliosis fructiferis; foliis erecto-patentibus incurviusculis e basi lata subtruncata ovato-oblongis acuminatis concavis carinato-costatis, costa valida cum apice desinente, toto ambitu incrassate limbatis veluti tricostatis superne grosse serratis, cellulis compactis minutis subpunctiformibus; perichætii oblongi foliis arcte imbricatis, inferioribus subsquamæformi-orbiculatis, superioribus ad medium erectis oblongo-convolutaceis dehinc subito horizontaliter reflexis tenui-acuminatis, omnibus ecostatis interrupte pellucide sublimbatis; archegoniis 45 – 50 paraphysibus numerosis fere duplo longioribus 30 – septatis basi interdum composite cellulatis; cætera desunt. — Hab. Forest at the eastern base of Mauna Kea, Hawaii, Sandwich Islands.

"24. RHIZOGONIUM PUNGENS (n. sp.): dioicum; cæspite denso hispido e viridi spadiceo; caulibus bi-triuncialibus basi fructiferis erectiusculis simplicibus inferne tomento atropurpureo dense vestitis; foliis laxiuscule dispositis patenti-divergentibus carinato-concavis semiuncialibus (arista inclusa) strictiusculis rigidis pungentibus elliptico-lanceolatis costa valida subtereti in aristam dorso et lateribus grosse dentatam lamina quintuplo longiorem excurrente instructis basi valde incrassatis e cellulis minutis densis subquadratis compositis, margine duplicato-dentato vel potius bilamelloso, lamellis dentatis; perichætiis radicalibus brevissime stipitatis; foliis perichætialibus exterioribus lanceolatis dentatis, interioribus oblongis integerrimis, omnibus laxius reticulatis basi vaginantibus costa excurrente valida dentata longissime aristatis; archegoniis longiusculis numerosis (40 – 50) copiose paraphysatis, paraphysibus 7 – 10-septatis archegonia paululum superantibus. — Hab. District of Puna, southwest coast of Hawaii, Sandwich Islands."

Professor William B. Rogers called the attention of the meeting to the different explanations which have been given of the two vertical beams of light which are seen stretching, the one upwards and the other downwards, from a luminous

point, as the flame of a candle, when we view it with the eyelids nearly closed. He said that until lately he had been accustomed to refer this phenomenon to *reflection* from the surfaces of the two eyelids, the lower surface reflecting the incident rays upwards through the eye, the upper surface in the opposite direction. From the oblique incidence of the light in each case, the minute irregularities of the surface might be supposed to have the effect, by a linear conjunction of images, of prolonging the picture on the retina, just as the ripples on a lake elongate the image of the moon, or of a burning torch when in a suitable position, so as to form a luminous band stretching over the water from beneath the object nearly to the spectator. A similar explanation has recently been suggested by M. Trouessart in the *Comptes Rendus*.

The seventh number of Poggendorf's *Annalen* for the present year contains a paper on this subject by H. Meyer of Leipsic, in which he refers these vertical beams to *refraction*. As the eyelids are moved over the eyeball, they gather before them the moisture which continually lubricates the surface of the eye. Owing to the oily secretion of the lids, this moisture, instead of spreading on their surface so as to form a concavity outwards, is by the opposite capillarity moulded into a converse form, which may be approximately regarded as a quarter-cylinder lying in the angle of junction of each eyelid with the cornea. The light striking the upper of these convexities will by refraction be bent upwards through the eye, and that incident on the lower will be bent downwards. In this view, therefore, the upper eyelid is the one concerned in producing the beam which appears vertically under the object, and the lower eyelid in producing that which appears vertically over it. But by the hypothesis of reflection the reverse of this must be the case, the beam above the object being due to the action of the upper eyelid, and the opposite beam to the lower eyelid.

Professor Rogers mentioned a simple experiment, which proves that the latter cannot be the true explanation, and which makes it extremely probable that M. Meyer has hit upon the correct one. If, when the eyelids are adjusted so as to develop the two vertical beams in great length and brightness, we cautiously lift away the *lower* eyelid from the cornea without changing the distance between the two eyelids, we observe that the *upper* beam instantly disappears; and so, on lifting the upper eyelid, the lower beam vanishes. This is just what ought to happen according to Meyer's view of the origin of the beams. The lifting of the eyelid, by breaking up the convexity of liquid, must of course put a stop to the fan-shaped refraction, and therefore extinguish the vertical beam corresponding to it above or below the luminous object. As the reflection from the surface of the eyelid would be but little altered by the slight removal from the cornea, we ought on the hypothesis of reflection either to find the two vertical beams unaltered, or that beam which is on the same side as the eyelid merely a little feebler and shorter. If, again, we revolve one of the eyelids entirely out of the range of action, while the other is retained in its place, the beam which disappears is found to be for the lower lid the upper beam, and for the upper lid the lower beam, as ought to be the case according to Meyer's explanation.

Professor Peirce made a communication on the relations of curves of which the equations are $\left\{ \begin{matrix} P = 0 \\ Q = 0 \end{matrix} \right\}$, in which the functions are derived from the equations $f(x + y \,.\, \sqrt{-1}) = P + Q \sqrt{-1}$.

Professor Agassiz added some remarks, in which he pointed out some interesting analogies, suggested by Professor Peirce's communication, in certain organic forms in the vegetable and animal kingdoms.

Professor Cooke called the attention of the Academy to some remarkable relations he had discovered between the atomic weights of the elements; and to some new facts which a knowledge of those relations had led him to observe. He considered the common classification of the elements as not founded on correct principles. Disregarding the distinction of metals and metalloids, and guided chiefly, though not exclusively, by the mode of combination and crystalline form, and bringing together those elements which bear the closest relations to each other, he had arranged the elements in six groups, the properties of each of which are closely related to each other, while they differ widely from those of any other group. The elements of any one group are, for the most part, isomorphous, and from similar compounds. Arranging the elements of any one group according to their relative affinities, and commencing with the strongest, he had found that the physical properties follow the same progression. As in organic chemistry differences of properties correspond to fixed differences of composition, he had noticed that, in like manner, in these series of inorganic chemistry, similar differences manifest themselves in differences of atomic weights. In the series in which he had classified the elements, the differences between the atomic weights of the consecutive members of any one series is always a multiple of some whole number. In one case it is 9, in another 8, in another 6, in another 5, in another 4, and in another 3. He stated that there are some discrepances between the atomic weights, as at present determined, and those required by his theory; and that, though in most cases they are within the limits of actual error, in others there is a residual. These remarks Professor Cooke illustrated very fully by referring to the group consisting of oxygen, nitrogen, phosphorus, arsenic, antimony, and bismuth. He showed that these elements have the same mode of combination; that they not only unite with the same number of atoms, but that the resulting compounds have similar properties, and form parallel series with the elements. He stated reasons for believing that phosphorus, antimony, and arsenic exist in two allotropic states. He had succeeded in crystallizing arsenic in regular octahedrons which belong to a new allotropic state of arsenic; which in this state differs in color, weight, and chemical properties from common arsenic.

He thought there could be little doubt that the members of the nitrogen series are isodimorphs, forming two isomorphous series, one rhombic and the other monometric; and that it was highly probable that the residuals he had noticed in some of the elements might be owing to a difference in the atomic weights of those elements in their two allotropic states.

An interesting discussion followed Professor Cooke's communication, in which Professor W. B. Rogers, Professor H. D. Rogers, and Professor Peirce took part. It was stated by Professor Peirce that the number *seven*, omitted in the common differences between the atomic weights of the elements, was also omitted in the series of fractions representing the relative distances of the planets from the sun, and the distribution of leaves around the stem of a plant.

Professor Agassiz made a communication on the fundamental law of distribution of organic forms. Further remarks on the same subject were made by Professor H. D. Rogers, in respect to its geological relations; by Dr. Pickering, who described the method he had followed in his researches respecting the distribution of animals; and by Professor Peirce.

Three hundred and ninety-second meeting.

January 10, 1854. — SEMI-MONTHLY MEETING.

The PRESIDENT in the chair.

The Corresponding Secretary, by appointment, acted as Recording Secretary, after the reading of the proceedings of the last meeting by J. Hale Abbott, the Secretary *pro tem.* of that meeting.

Dr. Hayes made a verbal communication on the disappearance of marsh-gas (light carburetted hydrogen) in nature, — occurring, as he had ascertained, by its spontaneous combustion, converting it into carbonic acid and water at ordinary temperatures, even at 32° Fahr. He had ascertained the same fact in respect to carbonic oxide also.

Remarks on this communication were made by Professor Cooke and Professor Horsford.